USDA

NATURAL RESOURCES CONSERVATION SERVICE

Watershed Science Institute

WSSI - General Technical Note 1

Vegetation Maintenance to Restore Northern Bobwhite Quail Habitat

CONTENTS:

Northern Bobwhite Quail foraging in vegetated field border.

Introduction

The northern bobwhite quail (*Colinus virginianus*) has long been considered "the King of Game Birds" of the South. Pursuit of this species has provided thousands of hours of recreation and generated millions of dollars of revenue. However, in the last 30 years, quail numbers have declined an average of 3 percent a year. With this reduction has come a corresponding decline in recreational opportunities and revenue. Researchers from the South have been searching for the reason(s) for the decline in the quail population. It is believed that a combination of factors are causal, including, increasing numbers of predators, wider use of pesticides, declining use of prescribed fire and large-scale changes in land use and management practices. Changes in land use and practices include: increased acreage in short rotation pine plantations, larger agriculture fields, "cleaner" farming, and urbanization.

For information on the contents of this Technical Note, contact Hank Henry, Terrestrial Ecologist, Watershed Science Institute, c/o Dept. of Soil Science, Box 7619, Raleigh, NC 27695-7619.
Tel: (919) 515-4181, e-mail: hank_henry@ncsu.edu.

Information and photographs in this Technical Note were provided by:

Dr. John R. Anderson Jr., Dept. of Crop Science, North Carolina State University
Dr. Peter T. Bromley, Dept. of Zoology, North Carolina State University
Dr. William E. Palmer, Tall Timbers Research Station, Tallahassee, Florida

In 1995, researchers from North Carolina State University (NCSU) studied the nesting ecology of quail using telemetry data from wild quail with radio-transmitters. They found that close mowing of ditches, canal banks and headlands, in combination with tillage from ditch to ditch, can significantly reduce quail numbers. Quail populations were approximately four times higher when field borders adjacent to ditch banks were managed rather than mowed. This study also showed that wildlife species other than quail benefit from the presence of managed, vegetated field borders. (The original study used field borders with a width of 15 feet. Researchers are currently studying borders as narrow as 10 feet).

Range of the Northern Bobwhite Quail (Adapted from the North American Breeding Bird Survey).

With these observations in mind, researchers began searching for an alternative to mowing that would allow farmers to maintain a vegetative cover on ditch banks that would favor wildlife without jeopardizing the drainage function of those ditches. As a result of the search, the Departments of Crop Science and Zoology began evaluating a herbicide application technology that promises to reduce vegetation maintenance costs while improving wildlife habitat and preserving water quality. The work has employed a herbicide wiping device, called the Weed Sweep™ [1], which dispenses 100% concentrations of herbicides, in low volume, on vegetation that is pushed down and scratched by a hardened aluminum bar. Research and

Large crop field without habitat along drainage ditch.

[1] The Watershed Science Institute neither endorses nor promotes any particular model or brand of herbicide wiping device. The Weed Sweep™, which is manufactured commercially in North Carolina, is named in this technical note since it is the only model currently being tested by NCSU.

demonstration activities suggest herbicide wiping via this system can be used to economically control undesirable vegetation in ditch banks and may be equally effective in such diverse places as power line rights-of-ways, field borders, filter strips, lagoon and pond perimeters, pastures, and roadsides.

BACKGROUND

The use of herbicides to control unwanted vegetation on farms is a common practice. When using broadcast herbicide sprays, however, chemical costs and the potential for drift and runoff are concerns. A viable "herbicide wiping" technology may reduce costs while resolving drift and runoff issues. It could also substitute for mowing, an expensive operation that may adversely affect wildlife habitat.

Weed Sweep™ technology in use.

The initial objective of the NCSU study was to control woody vegetation that would otherwise impair drainage ditches. The Weed Sweep™ system was selected to test herbicide wiping technology because it represented an opportunity to control vegetation at a cost much less than mowing. Adapted for control of vegetation on ditch banks and power line right-of-ways, the Weed Sweep™ has become an integral part of studies examining the impact of farming operations on bobwhite quail populations. Since the Weed Sweep™ may be operated at varying heights and angles, it applies herbicides to tall-growing woody plants in many vegetative environments without destroying low-growing, native plants that support wildlife, prevent erosion and filter nutrients.

This technology makes it possible to simultaneously:
(1) control tall, undesirable vegetation,
(2) greatly improve wildlife habitat and
(3) increase chemical and nutrient filtering characteristics of vegetative areas while
(4) reducing vegetation maintenance costs.

WEED SWEEP™ OPERATION

With the Weed Sweep™, an application speed of 3.0+ miles per hour is possible using tractors as small as 50hp. Speeds of 2.75 miles per hour are sustainable in right-of-ways with hilly terrain and 3-year old vegetation. Herbicide efficacy is increased by the presence of serrated "teeth" on the front of the Weed Sweep™ which is operated at a 30-degree forward angle to the ground at a height chosen by the operator.

The wiping surface features porous openings that function as a reservoir for undiluted herbicide. The herbicide is carried in a 3 ½ gallon tank attached to the tractor. As the machine travels, a small electric pump, calibrated for the speed of the tractor, pumps herbicide from the tank onto the wiping surface via a "soaker" hose located behind the blade. When calibrated properly, there is no herbicide drip so only vegetation which is scratched by the serrated bar is affected. Typical efficacy data from a Duke Power Company right-of-way test sight near Haw River, North Carolina is presented in Table 1. These data suggest that herbicide wiping can effectively control many woody species commonly found along ditch banks and right-of ways. It is likely that landowners may reduce costs even further by using the Weed Sweep™ once every three years versus annual mowing of ditch banks.

Close-up of the wiping surface showing the serrated bar.

Table 1. Control ratings for operation of the Weed Sweep™ in a Duke Power Company right-of-way, Haw River, NC.

	Percent Control*	
Species	4 weeks (10/13/95)	6 Months (3/13/96)
Maple (*Acer rubrum*)	0	87
Sweetgum (*Liquidambar styraciflua*)	16	98
Pine (mixed species)	3	30
Yellow-poplar (*Liriodendron tulipifera*)	8	57
Eastern Hophornbeam (*Ostry virginiana*)	0	67
Hickory (*Carya* sp.)	0	98
Oak (*Quercus* sp.)	0	77
Dogwood (*Cornus florida*)	2	81

* Application occurred on 9/13/95. Treatment was 29.2 ounces per acre (0.91 lb. active ingredients per acre) of glyphosate and 14.4 ounces per acre (0.22 lb. active ingredients per acre) of imazapyr wiped onto vegetation in the third year of a 3-year mowing cycle. For control ratings, any plants exhibiting new leaf tissue or viable buds were considered to be uncontrolled. At the 6-month rating, growth or spring leaf initiation of several species, most notably pines, was severally inhibited by herbicide treatment. However, numerous plants were rated as uncontrolled because living older leaves, viable buds or new leaves were observed on them.

The electric pump may be calibrated to apply an undiluted herbicide or tank mixture at an application rate from a pint per acre to a gallon per acre. NCSU researchers have evaluated glyphosate (Accord™, Roundup™, Rodeo™), glyphosate-imazapyr (Arsenal™) tank mixes and tank mixes containing triclopyr (Garlon™) at application volumes of 1/3 gallon per acre. The materials used have been undiluted herbicides, undiluted tank-mixes or herbicide(s) diluted with an adjuvant. Other herbicides may also provide adequate woody vegetation control. Operators find it convenient that water is not used to carry herbicides applied via this wiping technique.

The Weed Sweep™ prototype tested by NCSU was 8-feet wide and cost approximately $2,200 to assemble in 1994. It has proved durable in tests on 3-year old vegetation. In 1996, operational costs for one pass of the Weed Sweep™ applying 24 ounces/mile of glyphosate (0.97 acre) were estimated to be $11.39 per linear mile of ditch. In comparison, the North Carolina Department of Transportation pays $20.00 per linear mile for mowing one side of secondary roads and Carolina Power and Light pays $85.00 per acre for the mowing of power line right-of-ways on a 3-year cycle. Ongoing tests at both Carolina Power and Light and Duke Power Company suggest the Weed Sweep™ reduces right-of-way vegetation control costs by 50 percent.

Herbicide wiping technology called Weed Sweep™.

In 1994, 1995 and 1996, NCSU researchers employed the Weed Sweep™ to successfully control vegetation on ditch banks, in pastures and in power line right-of-ways. It appears this technology offers landowners a non-polluting, cost-effective way to control woody vegetation on ditch banks, field borders, pastures, roadsides and right-of-ways. It also eliminates the need for annual mowing that is detrimental for maintaining quality quail habitat. This wiping technique may also reduce ditch maintenance frequency by reducing the debris build up associated with mowing.

SUMMARY

Incorporating herbicide wiping technology in the management of field borders, ditch banks, pastures and right-of-ways not only improves quail habitat where used, but can also make available valuable cropland acres to wildlife. A resource management system with such components as crop residue use, conservation tillage, and cover crops can make formerly barren cropland useful to many species of wildlife. Wildlife habitat management at the field edge and in the crop field both benefit wildlife, but when brought together in a resource management system, the benefits are considerably greater than those of the individual components.

Successful field border management using Weed Sweep™ technology.

In 1997, NCSU will be evaluating Weed Sweep™ technology on power line right-of-ways and ditch banks in Alabama, Georgia, South Carolina and North Carolina. There is potential to expand this testing. Conservation Districts and landowners in the Southeast interested in setting up demonstration farms to test this technology should contact their local NRCS District Conservationists or State Biologist.